

拒絶理由通知書 OFFICIAL ACTION

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適用条文	第29条第2項、第36条

この出願は、次の理由によって拒絶をすべきものです。これについて意見がありましたら、この通知書の発送の日から3か月以内に意見書を提出してください。

理 由

1. この出願の下記の請求項に係る発明は、その出願前に日本国内又は外国において、頒布された下記の刊行物に記載された発明又は電気通信回線を通じて公衆に利用可能となった発明に基いて、その出願前にその発明の属する技術の分野における通常の知識を有する者が容易に発明をすることができたものであるから、特許法第29条第2項の規定により特許を受けることができない。

記 (引用文献等については引用文献等一覧参照)

- ・請求項1-14
- ・引用文献等1-3
- ・備考

引用文献1の第10図、【0055】には、「長手方向の縦ワイヤ3と該縦ワイヤ3に交差している横方向の横ワイヤ5とからなり、ケーブルを受入れることができる底および2つの側方フランジを備えているメッシュケーブルトレイ1、2を一体に接続する接続装置100において、接続装置100はプレート要素101とプレート要素101の上面に固定されたクランプ10からなり、クランプ10は互いに平行に配置されかつ横ワイヤ3を受入れることができ、横方向の横ワイヤ5の形状に適合する2つのくぼみ15a、15b（第一ハウジング）を設け、プレート要素101は、該くぼみ15a、15bに対して交差する方向で、長手方向の縦ワイヤ3をロックする溝102（ハウジング）を備え、かつ溝102が2つのくぼみ15a、15b間の中間線の両側に設けられ、前記溝102は、縦ワイヤ3をロックするためのものでありかつ横ワイヤ5のためのくぼみ15a、15bの両側にそれぞれ配置されている接続装置100」が記載されている

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拒絶の理由が新たに発見された場合には拒絶の理由が通知される。

CITED REFERENCE

引用文献等一覧

1. 欧州特許出願公開第1318585号明細書 EP-A
 2. 米国特許第5899041号明細書 *US Patent*
 3. 米国特許第6590154号明細書 *=*
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先行技術文献調査結果の記録

- ・調査した分野 IPC H02G3/00
- ・先行技術文献 なし

この拒絶理由通知の内容に関するお問い合わせ、または面接のご希望がございましたら下記までご連絡下さい。

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(Translation)

Dispatched on February 4, 2008

Notification of Reason for Rejection

Dated: January 29, 2008

To: Mr. Y. Kumakura, et al., agents for the applicant

From: K. Kitajima, Examiner of the Patent Office

Patent Application No. 2006-544488

The above mentioned application is considered to be subject to rejection on the grounds set out hereunder. If the applicant has anything to say, he should file an argument within three months from the date of dispatch of this document.

Grounds

1. The invention under the present application is considered to have been easy to invent for those skilled in the art on the basis of the inventions described in the following publications which were circulated or made available to the public through telecommunication lines in Japan or elsewhere prior to the present application and, therefore, it is considered unpatentable in view of the provisions of Article 29, Para. 2 of the Patent Law.

Reference:

1 EP No.1318585A1

2 US Patent No.5899041

3 US Patent No.6590154

• Claims 1-14 are obvious from References 1-3.

In Para. [0 0 5 5] and Fig.10 of Reference 1, there are described "a connecting device (100) for splicing together mesh cable trays (12) comprising longitudinal warp wires (3) and transverse weft wires (5) crossing the longitudinal warp wires (3), the mesh cable tray having a bottom adapted to receive cables and two flanges, characterized in that the connecting device (100) comprises clamps (10) fixed on the upper face of the plate element (101), the clamps being disposed parallel to each other and adapted to receive the transverse wires (3), and comprises two recesses (15a, 15b) (first housings) adapted to the form of the

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transverse weft wires (5) and locking grooves (102) transverse to the recesses (15a, 15b), the locking grooves being provided on each side of a median line between the two recesses (15a, 15b) and being adapted to lock the warp wires (3)."

In FIGS. 11 and 12 and column 4, lines 22-49 of Reference 2, there are described "a bracket for a wire cable tray having a profiled cross-section of an inverted U, the branches of the U forming two legs (11, 15), and the base of the U the upper face 13 thereof, the bracket comprising a tab (7) for fixing the wire formed by cutout in the upper face (13). " Thus, it is obvious to a person skilled in the art to utilize the arrangement of Reference 2 in the disclosures of Reference 1. In utilizing the arrangement of Reference 2 in the disclosures of Reference 1, it is well known in the art (for example, see FIGS. 1-11 of Reference 3) to provide "the upper face with a bore" , to provide "the locking tab with a cutout for a driver" and to provide "a ramp adjacent the locking tab" .

2 The Description and the Claims of the present application are incomplete in the following points and do not meet the requirements under Article 36, Section 6(ii) of the Patent Law.

• As to claim 1

(1) The term "or the like" is unclear in arrangement.
(2) In the recitation "at least one housing (12) substantially perpendicular to the first two housings (10), and in that at least one locking device (16) is provided on each side of a median line between the first two housings (10)" , it is unclear which direction wire of the wire cable tray the housing (12) locks.
Thus, claim 1 is unclear in invention.

• As to claim 7

(3) In claim 7 dependent on claims 3 and 5, there is a recitation "the cut-out" , but in claim 5, there is no recitation on the cut-out.
Thus, claim 7 is unclear in invention.

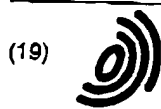
• As to claim 12

(4) In claim 12, there is a recitation "the base of the U comprises two longitudinal grooves (10) of which the concave form is directed outwardly of the U and

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furthermore two transverse cut-outs which continue over a portion of the height of the branches of the U so forming two transverse channels (12)", but since the directions of the members fitted in the accessory and the wire cable tray are reversed (the transverse weft wire (28) in the longitudinal groove (10) and the longitudinal warp wire (26) in the transverse channel (12)), the recitation of claim 12 is unclear.

Thus, claim 12 is unclear in invention.



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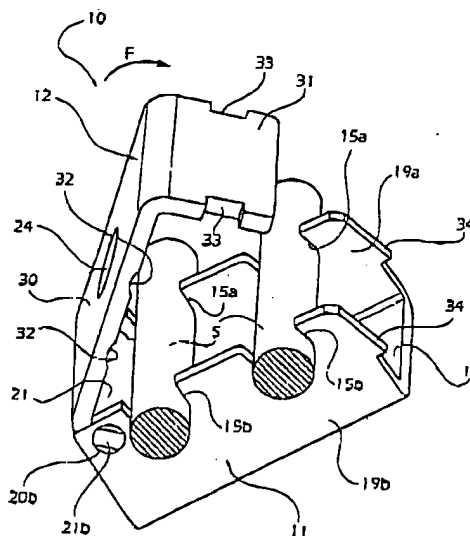
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(54) **A joining clamp for a mesh cable tray and a connecting device comprising such a joining clamp**

(57) The joining clamp (10) comprises separate first and second elements (11, 12), with at least one of these forming seats (17; 15a, 15b) for receiving a pair of facing and transverse wires (5) of two adjacent sections (1, 2) of mesh cable tray. The clamp (10) also comprises articulation means (20, 21; 20a, 20b, 21, 21a, 21b) for articulated connection of the first and second elements (11, 12) in a pre-assembled condition in which these elements are rotatable relative to each other between an open position, in which the pair of facing and transverse wires (5) can be inserted into the respective seats (17; 15a, 15b), and a closed position, in which the wires (5) are securely locked in the seats (17; 15a, 15b). The clamp (10) further comprises snap-engagement members (22, 23; 29; 33, 34) for securing the first and second elements (11, 12) together upon relative rotation thereof from the open position to the closed position.

Fig. 5**EP 1 318 585 A1**

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Description

[0001] The present invention relates to a joining clamp for a mesh cable tray, as specified in the preamble of Claim 1.

[0002] In order to house and protect cables, in particular electric cables, it is known to use mesh trays, comprising a series of longitudinal wires and a series of transverse wires connected with each other to form a mesh, wherein each transverse wire includes a horizontal bottom segment and two vertical parallel segments extending perpendicular to the bottom segment so that the transverse wire is generally U-shaped.

[0003] Mesh cable trays are manufactured in sections of a given length, the opposite longitudinal ends of which are defined by respective transverse wires, hereafter referred to as end transverse wires or first transverse wires. In order to connect two separate, adjacent mesh tray sections, these are brought together longitudinally until their respective first transverse wires are close to each other and thus can be clipped together by joining devices, such as clamps, fitted to pairs of vertical and/or bottom segments of the two facing wires.

[0004] A joining clamp for connecting two separate, adjacent mesh cable tray sections is known, for example, from German patent application DE-20 36 325, in which is disclosed a clamp comprising two shaped plate elements, one of which forms a pair of seats for securing longitudinally the two transverse wires to be joined, whereas the other of which provides an abutment surface for transversely locking the two wires into the pair of seats. Threaded fixing members, such as bolts and nuts, are provided for securely fitting the two elements to each other.

[0005] A similar arrangement for a joining clamp is also known from Austrian patent AT-329 133.

[0006] A structural variant is also known from French patent application FR-2 656 961, which discloses a clamping device for a mesh cable tray comprising two plates each having a bottom flat portion the two opposite edges of which form folded flaps, complementary to each other and defining a seat for housing and securing the pair of wires to be joined. One of the two plates is provided also with a screw which passes through the above-mentioned seat, keeping the two wires apart, and protrudes from a hole in the opposite plate, thereby enabling the assembly to be secured by means of a nut.

[0007] Finally, European patent application EP-0 617 493 discloses a connecting device for a mesh cable tray, in which the two transverse wires to be joined are locked between a T-shaped bolt head and a plate with a rectangular bottom surface from a pair of opposite edges of which extend two flaps bent at a right angle. In this example as well, the assembly is secured by screwing a nut onto a portion of the bolt shank protruding from a hole provided in the bottom surface of the plate.

[0008] According to the above-discussed prior art, devices for connecting two mesh cable tray sections re-

quire to be locked by means of threaded connection members in order to secure the assembly. However, the use of threaded connection members makes assembling slower and more difficult.

[0009] It is therefore the object of the present invention to provide an improved joining clamp for a mesh cable tray with respect to the above-discussed prior art, and, in particular, a clamp which enables simple and quick assembling without requiring screwing up.

[0010] This object is fully achieved according to the invention by virtue of a joining clamp having the characteristics defined in independent Claim 1.

[0011] A further object of the invention is to provide a connecting device for a mesh cable tray which enables simple and quick assembling without requiring screwing up and assures a strong connection and an accurate alignment of the two tray sections to be connected.

[0012] This further object is fully achieved by virtue of a connecting device as defined in independent Claim 15.

[0013] To sum up, the present invention is based on the idea of providing a joining clamp which comprises two metal plate elements adapted to define, when assembled, a pair of seats for receiving and securing the facing transverse wires of two mesh tray sections to be connected, wherein the two elements are provided in pre-assembled arrangement and can be securely fitted to each other by snap-engaging means.

[0014] This solution offers clearly the advantage of enabling simple and quick assembling, since the two plate elements of the clamp can be fitted to each other to secure the two facing transverse wires to be joined simply by being pressed lightly against each other. This operation can be easily performed with one hand, either by using two fingers or with the help of pliers.

[0015] Further characteristics and advantages of the invention will be explained in greater detail in the following description, given purely by way of non-limitative example, with reference to the appended drawings, in which

[0016] Figure 1 is a perspective view from above of a joining clamp according to a first embodiment of the present invention, in its initial, pre-assembled condition for preliminary connection of a pair of vertical segments of the facing end transverse wires of two adjacent mesh tray sections to be connected;

[0017] Figure 2 is a perspective view from above of the joining clamp of Figure 1, in its final, assembled condition for secure connection of the two adjacent mesh tray sections;

[0018] Figure 3 is a perspective view from above of a structural variant of a joining clamp according to the present invention, in its pre-assembled condition;

[0019] Figure 4 is a perspective view from above of the joining clamp of Figure 3, in its assembled condition;

[0020] Figure 5 is a perspective view from below of a further structural variant of a joining clamp according to the present invention, in its pre-assembled condition;

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[0021] Figure 6 is a perspective view from above of the joining clamp of Figure 5, in its assembled condition;

[0022] Figure 7 is a plan view of one of the two elements forming the joining clamp of Figures 5 and 6, showing in detail the outline of a pair of notches for engaging the two transverse wires to be connected;

[0023] Figure 8 is a perspective view of a first embodiment of a connecting device for mesh cable trays according to the invention, in its pre-assembled condition;

[0024] Figure 9 is a perspective view from above of the connecting device of Figure 8, in its assembled condition;

[0025] Figure 10 is a perspective view of a further embodiment of a connecting device for mesh cable trays according to the invention, in its pre-assembled condition.

[0026] With reference to the drawings, longitudinally adjacent first and second sections of a mesh cable tray are generally indicated 1 and 2, and include each a series of longitudinal metal wires 3 and a series of transverse metal wires 5 (of which only the end wire is illustrated), connected with each other to form a mesh. Each transverse wire 5 includes a typically straight bottom segment 6 and a pair of vertical parallel segments 7 extending perpendicular to the bottom segment, so that the transverse wire is generally U-shaped.

[0027] In order to securely connect the two mesh tray sections 1 and 2, a plurality of joining clamps 10 (of which only one is shown) clip the two end transverse wires 5 of these sections together. At least two clamps are arranged to secure the facing vertical segments 7 of the two end transverse wires 5, while one or more clamps can also be arranged, if necessary, to secure the bottom segments 6 of these wires in order to provide a further constraint against relative rotation of the two tray sections.

[0028] Each clamp 10 comprises first and second elements, indicated 11 and 12, respectively, manufactured by blanking and forming a metal sheet. The first element 11 forms, by co-operating, if necessary, with the second element 12, a pair of seats for receiving and securing longitudinally, at a predetermined distance from each other, the pairs of facing segments 6 and 7 of the two transverse wires 5 to be connected.

[0029] With the joining clamp 10 in an initial, pre-assembled condition (shown in Figures 1, 3 and 5), the second element 12 can be rotated to the element 11 about an axis essentially parallel to the wire segment to be clamped, in order to allow the two transverse wires 5 to be inserted into their seats. In a final, assembled condition (shown in Figures 2, 4 and 6), on the other hand, the second element 12 is locked to the first by snap-engaging means in order to securely clamp the two transverse wires 5.

[0030] With reference now to Figures 1 and 2, in which there is illustrated a first embodiment of a joining clamp according to the invention, the first element 11 comprises a central portion 16 formed as a rectangular flat plate,

arranged in use in a plane essentially parallel to the wire segment to be clamped. The central portion 16 forms integrally two channel portions 17, which extend from two opposite edges of the portion 16 and define the seats for receiving the two transverse-wire segments 6, 7 (in the illustrated example, the vertical segments 7).

[0031] Each channel portion 17 comprises a bottom 18, essentially parallel to the plate portion 16, joined by its inner edge to the portion 16 and by its outer edge to a respective side portion 19a, 19b in the shape of a rectangular plate extending essentially perpendicular to the central portion 16.

[0032] The second element 12 is a substantially rectangular, flat plate such that with the clamp 10 in its assembled condition (Figure 2) the element 12 can be interposed between the side portions 19a, 19b of the first element 11 in facing, parallel relationship with the central portion 18 of the first element 11.

[0033] The side portion 19a of the first element 11 has a rectangular slot 20, essentially parallel to the wire segment to be clamped, into which can be inserted a tongue 21 projecting horizontally from the second element 12 and bent at an angle to this latter. As shown in Figure 1, by inserting the tongue 21 of the second element 12 into the slot 20 in the first element 11, it is possible to provide the clamp 10 in a pre-assembled condition in which the two elements are coupled together in such a way that they can rotate relative to each other about an axis corresponding approximately to the axis of the slot 20, that is, essentially parallel to the wire segments to be clamped. With the clamp in this condition, the end transverse wires 5 of the two tray sections 1 and 2 to be connected can be received into their seats 17 in the first element 11.

[0034] At this point, in order to secure the assembly, the second element 12 is turned in the direction of the arrow F until it snap-engages the side portion 19b of the first element 11. To this end, the side edge of the element 12 opposite that forming the tongue 21 has a pair of laterally projecting teeth 22 (only shown in Figure 1) which insert into corresponding slots 23 provided in the side portion 19b. In the assembled condition (Figure 2) the two transverse wires 5 are thus locked by the element 12 in the respective seats formed by the channel portions 17.

[0035] Advantageously, the joining clamp 10 can be securely held in the assembled condition described above also by fastening together the two elements 11 and 12 by means of threaded fixing members. To this end, the second element 12 has a central hole 24 and the central portion 16 of the first element 11 has a slot 25 aligned with the hole 24, so that with the clamp 10 in its assembled condition (Figure 2) a bolt 26 can be passed through the hole 24 and the slot 25 to be secured by a nut 27.

[0036] A structural variant of a joining clamp according to the present invention is illustrated in Figures 3 and 4, in which elements or components identical or func-

tionally equivalent to those illustrated in Figures 1 and 2 have been given the same reference numbers.

[0037] According to this variant, the first element 11 includes a bottom central portion 16, in the shape of a substantially rectangular plate, with two side plate portions 19a and 19b extending essentially perpendicular thereto. As in the example discussed above, advantageously the bottom portion 16 has a central opening 25 which, once the clamp is assembled, is aligned with an opening 24 in the second element 12 to allow the insertion of a fixing bolt (not shown).

[0038] In addition, a pair of upper and lower projections 13a and 13b, respectively, protrude at right angles from the portion 16 in the same direction as the side portions 19a and 19b of the first element 11, in order to form the seats for receiving the two transverse wires 5. The two projections 13a and 13b are formed by blanking and bending respective portions of the metal sheet forming the bottom portion 16 on opposite sides with respect to a plane through the centre of the portion 16, so as to cooperate with the side portions 19a and 19b to secure longitudinally the transverse wires 5.

[0039] In the same way, also the second element 12 of the joining clamp 10 which, as in the embodiment described above, is formed as a flat rectangular plate, has a pair of lower and upper projections 14a and 14b, respectively, which protrude at right angles from the element 12 on opposite sides with respect to a plane through the centre of this element, so that in the assembled condition (Figure 4) they are aligned with the projections 13a and 13b, respectively. In the assembled condition, therefore, each segment of transverse wire 5 is secured in a seat 17 defined on the outside by a respective side portion 19a, 19b of the first element 11 and on the inside by a pair of upper and lower projections 13a, 14a and 13b, 14b, respectively.

[0040] The second element 12 has an extension 21, projecting laterally from the plate portion and bent substantially at a right angle thereto, for engaging a vertical slit 20 in the side portion 19a of the first element 11 in order to enable the two elements of the clamp to be pre-assembled in such a way that they can be rotated relative to each other about an axis essentially parallel to the wire segments to be clamped (as indicated by the arrow F).

[0041] In this case, the two elements 11 and 12 can be snap-engaged by virtue of the side portion 19b of the first element 11 comprising an extension 28, slightly inclined outwardly and joined to the portion 19b through a bent portion 29 forming a step. In this way, when the second element 12 is rotated in the direction of the arrow F to be clamped on the first element 11, the end edge of the element 12 opposite the end articulated to the element 11 slides along a ramp formed by the extension 28 of the side portion 19b until it snaps resiliently past the step 29 and is thus locked into its assembled condition (Figure 2).

[0042] A further structural variant of a joining clamp

according to the present invention is illustrated in Figures 5 and 6, in which elements or components identical or functionally equivalent to those illustrated in Figures 1 to 4 have been given the same reference numbers.

[0043] According to this further variant, the first element 11 of the clamp comprises a bottom central portion 16 formed as a flat rectangular plate and two opposed, substantially symmetrical, flat portions 19a and 19b, respectively, extending transversely from opposite edges of the central portion 16.

[0044] The outer edges of the two opposed portions 19a and 19b of the first element 11 have respective pairs of notches 15a and 15b, open outwards and aligned in pairs for receiving the facing segments of the end transverse wires 5 of the two tray sections to be connected. The transverse size of the notches 15a, 15b is only slightly greater than the diameter of the wires 5, so as to lock them transversely, whereas their depth is advantageously smaller, so that a portion of the wires protrudes from the notches 15a, 15b to be engaged by the second element 12, as will be better explained in the following part of the description. As better illustrated in Figure 7, the outline of the notches 15a, 15b is preferably formed by two straight parallel sides joined by a semicircular bottom portion.

[0045] Two aligned holes 20a and 20b are also provided in the two opposed portions 19a and 19b of the first element 11, for engagement by respective pins 21a and 21b for articulation of the second element 12.

[0046] The second element 12 comprises a rectangular, flat, central portion 30, the sizes of which are substantially the same as those of the bottom portion 16 of the first element 11. In the inner surface of the portion 30, that is, the surface facing the first element 11, there is formed a pair of cylindrical grooves, indicated 32, which in the assembled condition (Figure 8) lock the transverse wires 5 into the seats formed by the notches 15a and 15b in the first element 11.

[0047] A flap 21 integral with the central portion 30 of the second element 12 and arranged to be inserted between the two opposed portions 19a and 19b of the first element 11 extends from one of the two opposite edges of the portion 30 essentially parallel to the wire segments to be clamped. The flap 21 forms an upper pin 21a and a lower pin 21b which, when engaged in the holes 20a and 20b, respectively, provided in the portions 19a and 19b of the first element 11, enable the two elements of the clamp 11, 12 to rotate relative to each other about an axis essentially parallel to the wire segments to be clamped. From the opposite edge of the central portion 30, on the other hand, extends a side portion 31, the two opposite edges of which facing the opposed portions 19a and 19b of the first element 11 form a pair of aligned seats 33 for snap-engagement by corresponding catch members 34 provided by the portions 19a, 19b.

[0048] The catch members 34 are shaped as teeth, with a ramp profile starting from the free end of the re-

spective portion 19a, 19b of the second element 12 and ending in a step. In this way, when the second element 12 is rotated in the direction of the arrow F to be secured to the first element 11, the side portion 31 of the element 12 moves up along the two ramps formed by the catch members 34 until the seats 33 cross those ramps and pass resiliently beyond the step-like flanks of the members 34, thus remaining locked in the assembled condition (Figure 6).

[0049] As in the embodiments illustrated before, also in this case it is possible, although not compulsory, to secure the connection between the two elements 11 and 12 of the joining clamp 10 by threaded fixing means. This may be achieved either by using a bolt and nut or by screwing a screw into a threaded hole 25 provided in the bottom portion 16 of the first element 11.

[0050] Advantageously, the two straight parallel sides of the two notches 15a and 15b furthest from the axis of articulation of the elements 11 and 12 are not perpendicular to the bottom central portion 16 of the first element 11, but are slightly inclined to the perpendicular (Figure 7). This arrangement offers the advantage of greater safety against accidental disassembling of the clamp. In fact, even in case of failure of the snap-engagement between the two elements 11 and 12 of the clamp, the first element 11 cannot come loose from the two transverse wires 5 simply as a result of transverse movement, just by virtue of one of the two notches 15a being not orientated exactly transversely. In particular, since this notch is inclined away from the other, in order to disengage the wire received therein it is necessary to bring the two end transverse wires 5 of the two tray sections 1 and 2 longitudinally nearer each other.

[0051] A joining clamp according to the invention can be advantageously used to provide a connecting device for mesh cable trays, as shown in Figures 8 to 10.

[0052] A first embodiment of such a connecting device is illustrated in Figures 8 and 9, where parts and elements identical or functionally equivalent to those illustrated in the preceding figures have been indicated by the same reference numbers.

[0053] With reference to Figures 8 and 9, a connecting device according to the invention is generally indicated 100 and comprises basically a plate element 101 and a pair of joining clamps 10 of the same type as those described before (for example, that illustrated in Figures 5 and 6) fixed to the plate element 101. The plate element 101 forms a pair of flat side portions 103 for fixing the clamps 10 thereto and a recessed central portion 102 for engaging the end portions of a pair of essentially aligned, longitudinal wires 3 of the two mesh cable tray sections 1, 2 to be connected. The two clamps 10 are arranged to secure the bottom segments 6 (as shown in Figure 9) or the vertical segments 7 of the end transverse wires 5 of the two mesh tray sections to be connected. The clamps 10 are attached on the flat side portions 103 of the plate element 101, for example, by welding or screw-fixing. In the latter case, it is possible to use

the same bolts 26 as those provided for securing together the two elements 11 and 12 of each clamp.

[0054] A second embodiment of a connecting device according to the invention is illustrated in Figure 10, where parts and elements identical or functionally equivalent to those illustrated in Figures 8 and 9 have been indicated by the same reference numbers.

[0055] With reference to Figure 10, the connecting device 100 comprises basically a plate element 101, in the central portion of which there is fixed one joining clamp 10 of the same type as those described before (for example, that illustrated in Figures 5 and 6). The clamp 10 is arranged to secure the bottom segments 6 or the vertical segments 7 of the end transverse wires 5 of the two mesh tray sections to be connected. The plate element 101 forms, along a longitudinal edge thereof, a pair of channel portions 102 for engaging the end portions of a pair of essentially aligned, longitudinal wires 3 of the two mesh tray sections to be connected. The clamp 10 is fixed to the plate element 101, for example, by welding or screw-fixing, as in the first embodiment described above.

[0056] Clearly, a connecting device according to the present invention offers the advantage of providing strong connection and precise alignment between the two tray sections to be connected and enabling, at the same time, simple and quick assembling.

[0057] Naturally, the principle of the invention remaining unchanged, embodiments and manufacturing details may vary widely with respect to those described and illustrated purely by way of non-limitative example. This applies in particular to the snap-engagement means for the two elements of the clamp and to the shape of the seats in the clamp for securing the end transverse wires of the two mesh cable tray sections to be connected.

Claims

1. A joining clamp (10) for a mesh cable tray comprising a series of longitudinal wires (3) and a series of transverse wires (5) connected with each other to form a mesh; the clamp (10) including separate first and second elements (11, 12), with at least one of these forming seats (17; 15a, 15b) for receiving a pair of facing end transverse wires (5) of two adjacent sections (1, 2) of mesh cable tray; characterised in that it comprises

articulation means (20, 21; 20a, 20b, 21, 21a, 21b) for articulated connection of the first and second elements (11, 12) in a pre-assembled condition in which these elements are rotatable relative to each other between an open position, in which the pair of facing end transverse wires (5) can be inserted into the respective seats (17; 15a, 15b), and a closed position, in

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- which the wires (5) are securely locked in the seats (17; 15a, 15b); and snap-engagement means (22, 23; 29; 33, 34) for securing the first and second elements (11, 12) together upon relative rotation thereof from the open position to the closed position.
2. A joining clamp according to Claim 1, **characterised in that** the first and second elements (11, 12) have respective openings (24, 25) which face one another in the closed position so as to enable threaded fixing means to be passed through for securing the two elements (11, 12) together.
 3. A joining clamp according to Claim 1, **characterised in that** the said articulation means (20, 21; 20a, 20b, 21, 21a, 21b) are arranged to enable, in the pre-assembled condition, relative rotation of the first and second elements (11, 12) about an axis substantially parallel to the axes of the segments of the end transverse wires (5) to be clamped.
 4. A joining clamp according to Claim 1, **characterised in that** the first element (11) includes a central plate portion (16) and a pair of facing side plate portions (19a, 19b) which extend essentially perpendicular to the central portion (16) from opposite edges thereof; and in that the second element (12) comprises a central plate portion (30) which is interposed, in the closed position, between the side plate portions (19a, 19b) of the first element (11) for clamping the two end transverse wires (5) to be locked in the seats (17; 15a, 15b).
 5. A joining clamp according to Claim 4, **characterised in that** the said articulation means for articulated connection of the first and second elements (11, 12) comprise a slot (20) provided in one (19a) of the facing side plate portions (19a, 19b) of the first element (11) and an extension (21) projecting laterally from the central plate portion (30) of the second element (12) and arranged to be engaged in the slot (20); and in that the said snap-engagement means comprise a slot (23) provided in the other (19b) of the facing side plate portions (19a, 19b) of the first element (11) and a tooth (22) projecting laterally from the central plate portion (30) of the second element (12) and arranged to snap-engage in the slot (23) upon relative rotation of the two elements (11, 12) from the open position to the closed position.
 6. A joining clamp according to Claim 4, **characterised in that** the facing side plate portions (19a, 19b) of the first element (11) each have a pair of notches (15a, 15b) for receiving the pair of facing end transverse wires (5) to be clamped.
 7. A joining clamp according to Claim 8, **characterised in that** the depth of the notches (15a, 15b) provided in the facing side plate portions (19a, 19b) of the first element (11) is less than the diameter of the transverse wires (5) to be clamped, so that the transverse wires (5), when received in the notches (15a, 15b), protrude from the end edges of the side plate portions (19a, 19b) and can be locked against the bottom of the notches (15a, 15b) by the central plate portion (30) of the second element (12) upon relative rotation of the two elements (11, 12) to the closed position.
 8. A joining clamp according to Claim 7, **characterised in that** the two notches (15a, 15b) furthest from the articulation means (20a, 20b, 21, 21a, 21b) each have a pair of parallel sides inclined to the perpendicular axis of the central plate portion (16) of the first element (11).
 9. A joining clamp according to Claim 6, **characterised in that** the said snap-engagement means comprise a pair of seats (33) provided in opposite edges of a side plate portion (31) extending essentially transversely from the central plate portion (30) of the second element (12); and a pair of catch members (34) formed by opposite edges of the facing side plate portions (19a, 19b) of the first element (11), the catch members being shaped as teeth with a ramp profile rising towards the central plate portion (16) for snap-engaging the seats (33) upon relative rotation of the two elements (11, 12) to the closed position.
 10. A joining clamp according to Claim 4, **characterised in that** the seats for receiving the two facing end transverse wires (5) of the two mesh cable tray sections (1, 2) to be connected are formed by a pair of channel portions (17) interposed between the central plate portion (16) and the two facing side plate portions (19a, 19b) of the first element (11).
 11. A joining clamp according to Claim 4, **characterised in that** each of the seats (17) for receiving the two facing end transverse wires (5) of the two mesh cable tray sections (1, 2) to be connected is defined on the inside by at least one projection (13a, 13b) extending transversely from the central plate portion (16) of the first element (11) and on the outside by the one of the two facing side plate portions (19a, 19b) of the first element (11) adjacent the at least one projection (13a, 13b).
 12. A joining clamp according to Claim 11, **characterised in that** the central plate portion (30) of the sec-

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and element (12) forms at least one projection (14a, 14b) for each seat (17), which extends transversely from the plate portion (30) so that, in the assembled condition, the at least one projection (14a, 14b) of the second element (12) co-operates with the at least one projection (13a, 13b) of the central plate portion (16) of the first element (11) to clamp an end transverse wire (5) against the respective side plate portion (19a, 19b) of the first element (11).

13. A joining clamp according to Claim 11 or Claim 12, characterised in that the at least one projection (13a, 13b; 14a, 14b) of the first and second elements (11, 12) is formed by blanking and bending a corresponding edge of the central plate portion (16; 30) of the respective element (11, 12).

14. A joining clamp according to Claim 4, characterised in that the said snap-engagement means comprise a ramp-shape projection (28) integrally formed by one (19b) of the facing side plate portions (19a, 19b) of the first element (11), the projection (28) being inclined outwardly of the element (11) and joined to the respective side plate portion (19b) by means of a portion (29) folded to form a step, whereby upon relative rotation of the first and second elements (11, 12) to each other, the side edge of the second element (12) facing the side plate portion (19b) of the first element (11) is forced to slide along the inner surface of the projection (28) until it resiliently snaps past the step portion (29), thus locking the two elements (11, 12) in the assembled condition.

15. A connecting device (100) for a mesh cable tray comprising a series of longitudinal wires (3) and a series of transverse wires (5) connected with each other to form a mesh; characterised in that it comprises

a plate element (101) for engaging the end portions of a pair of essentially aligned, longitudinal wires (3) of two adjacent sections (1, 2) of mesh cable tray; and
at least one joining clamp (10) fixed onto the plate element (101) and including

- separate first and second elements (11, 12), with at least one of these forming seats (17; 15a, 15b) for receiving a pair of facing end transverse wires (5) of the two adjacent tray sections (1, 2) to be connected;
- articulation means (20, 21; 20a, 20b, 21, 21a, 21b) for articulated connection of the first and second elements (11, 12) in a pre-assembled condition in which these elements are rotatable relative to each other between an open position, in which the pair

of facing end transverse wires (5) can be inserted into the respective seats (17; 15a, 15b), and a closed position, in which the wires (5) are securely locked in the seats (17; 15a, 15b); and

- snap-engagement means (22, 23; 29; 33, 34) for securing the first and second elements (11, 12) together upon relative rotation thereof from the open position to the closed position.

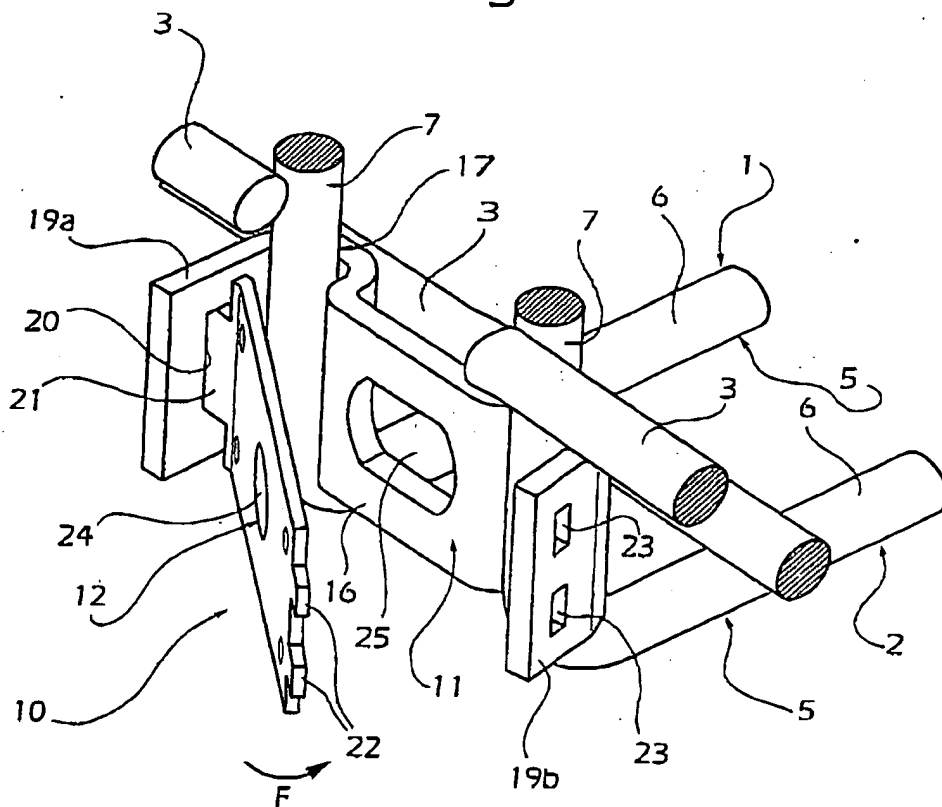
16. A connecting device according to Claim 15, of the type comprising one joining clamp (10), characterised in that the plate element (101) is longitudinally elongate and forms a pair of channel portions (102) integral with a longitudinal edge portion of the plate element (101) for engaging the end portions of the two aligned longitudinal wires (3) of the two mesh cable tray sections (1, 2) to be connected.

17. A connecting device according to Claim 15, of the type comprising a pair of joining clamps (10), characterised in that the plate element (101) is transversely elongate and forms a central recessed portion (102) for engaging the end portions of the two aligned longitudinal wires (3) of the two mesh cable tray sections (1, 2) to be connected; the two joining clamps (10) being fixed to the plate element (101) on opposite sides with respect to the recessed portion (102).

18. A connecting device according to any of Claims 15 to 17, characterised in that the at least one joining clamp (10) is fixed to the plate element (101) by welding or screwing.

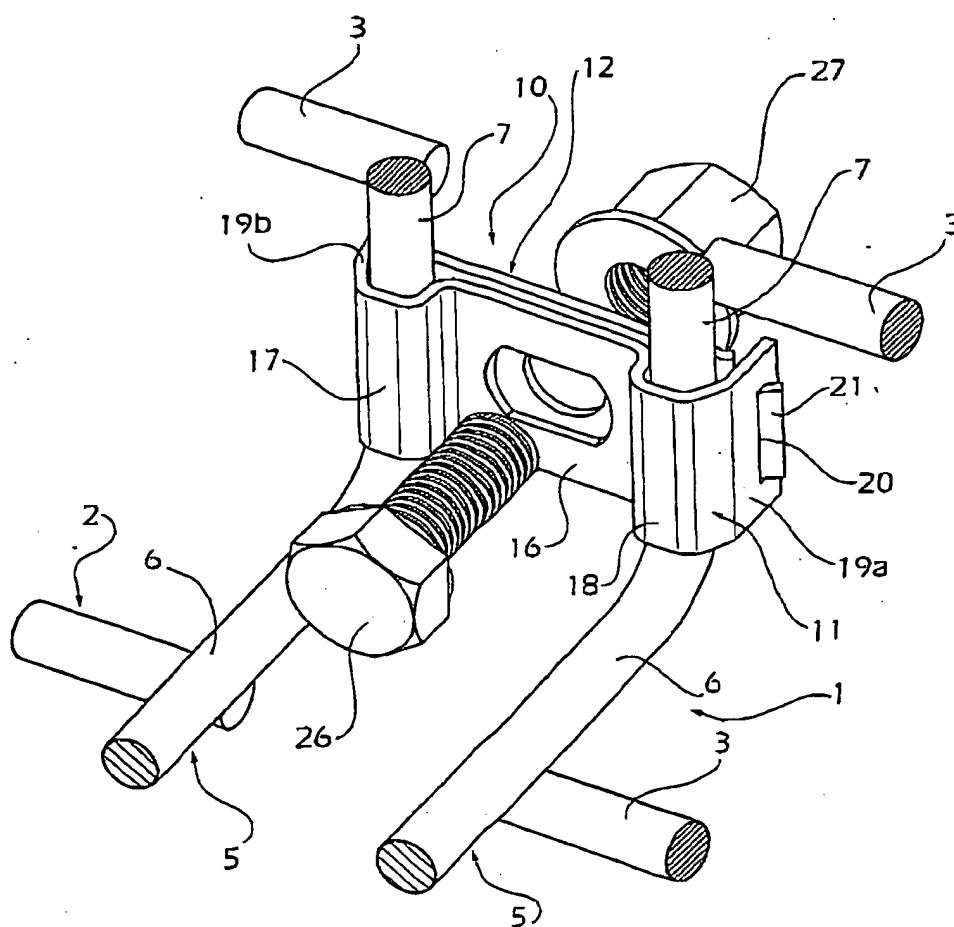
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Fig. 1



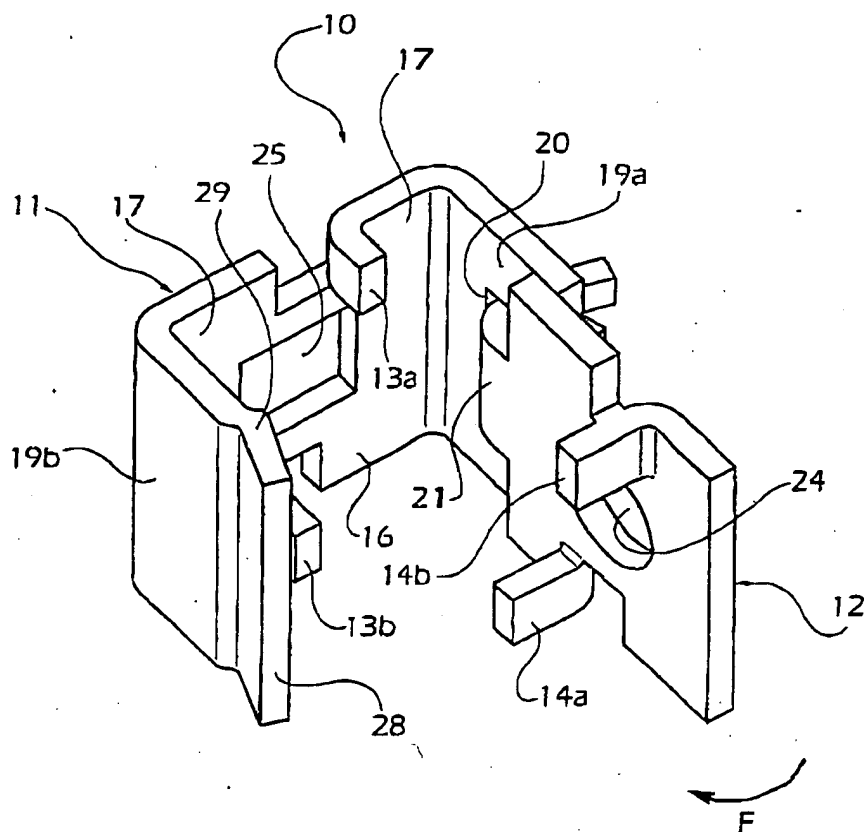
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Fig. 2



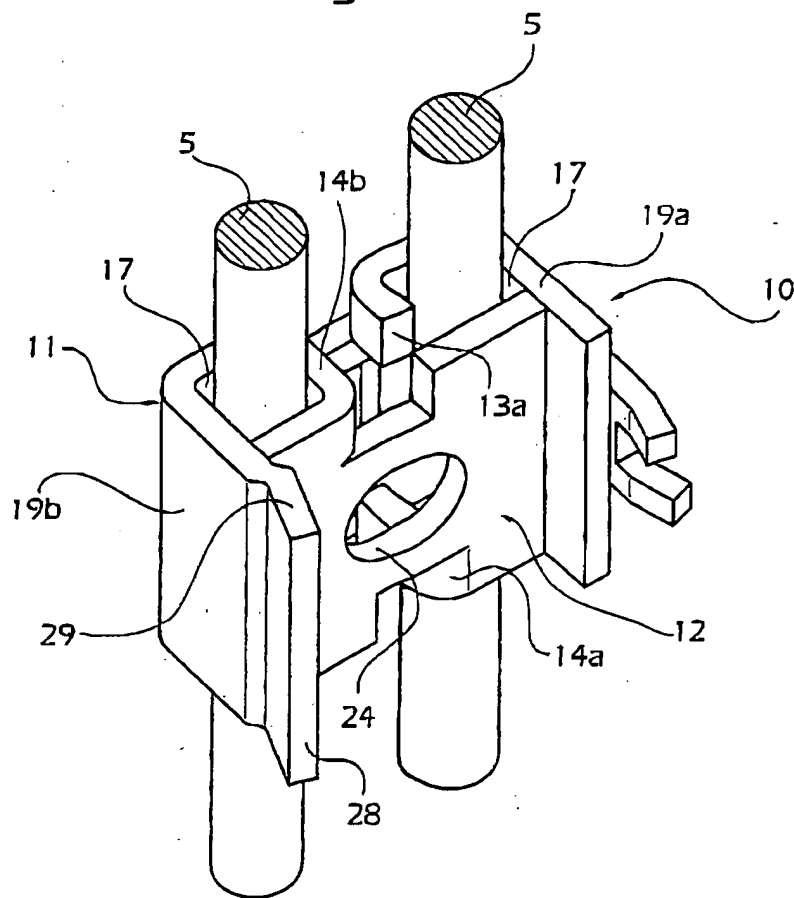
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Fig. 3



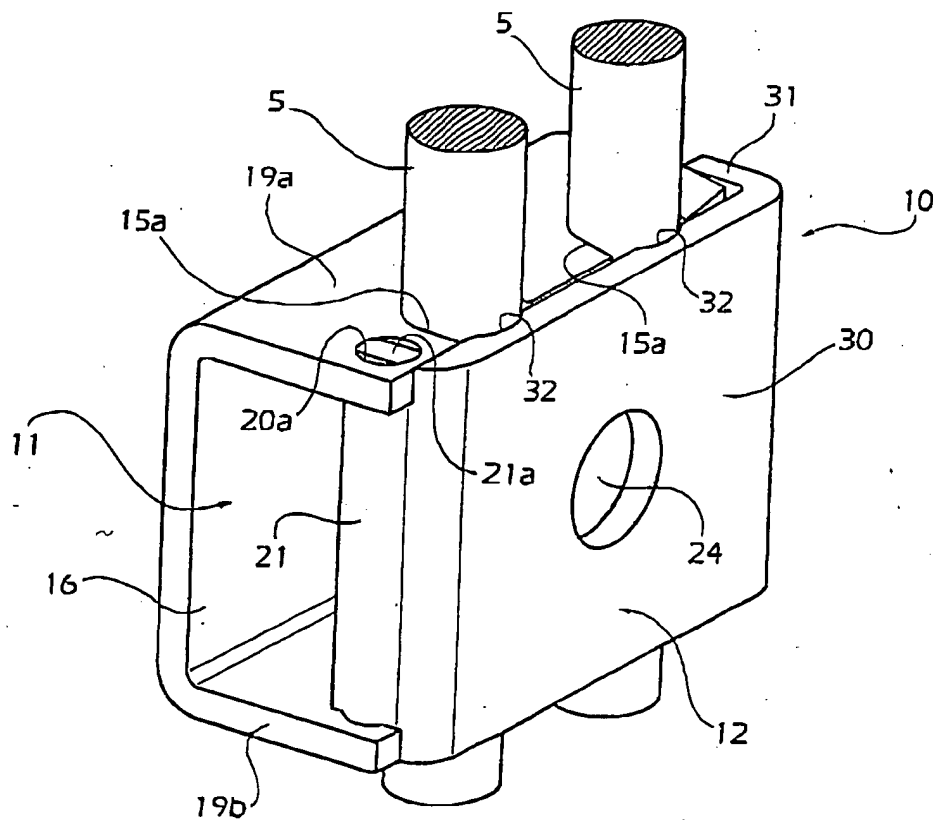
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Fig. 4



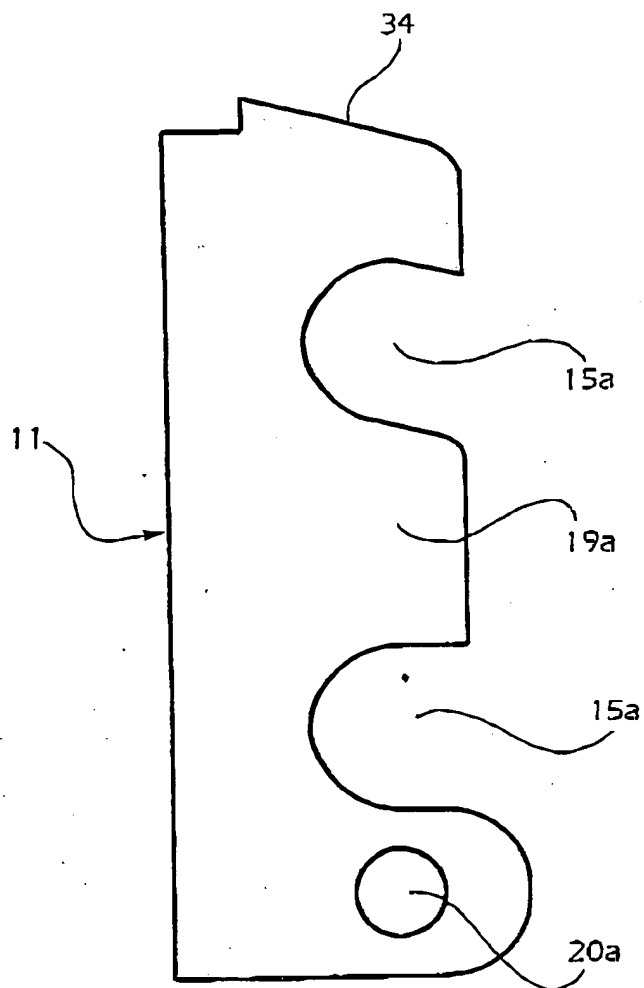
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Fig. 6



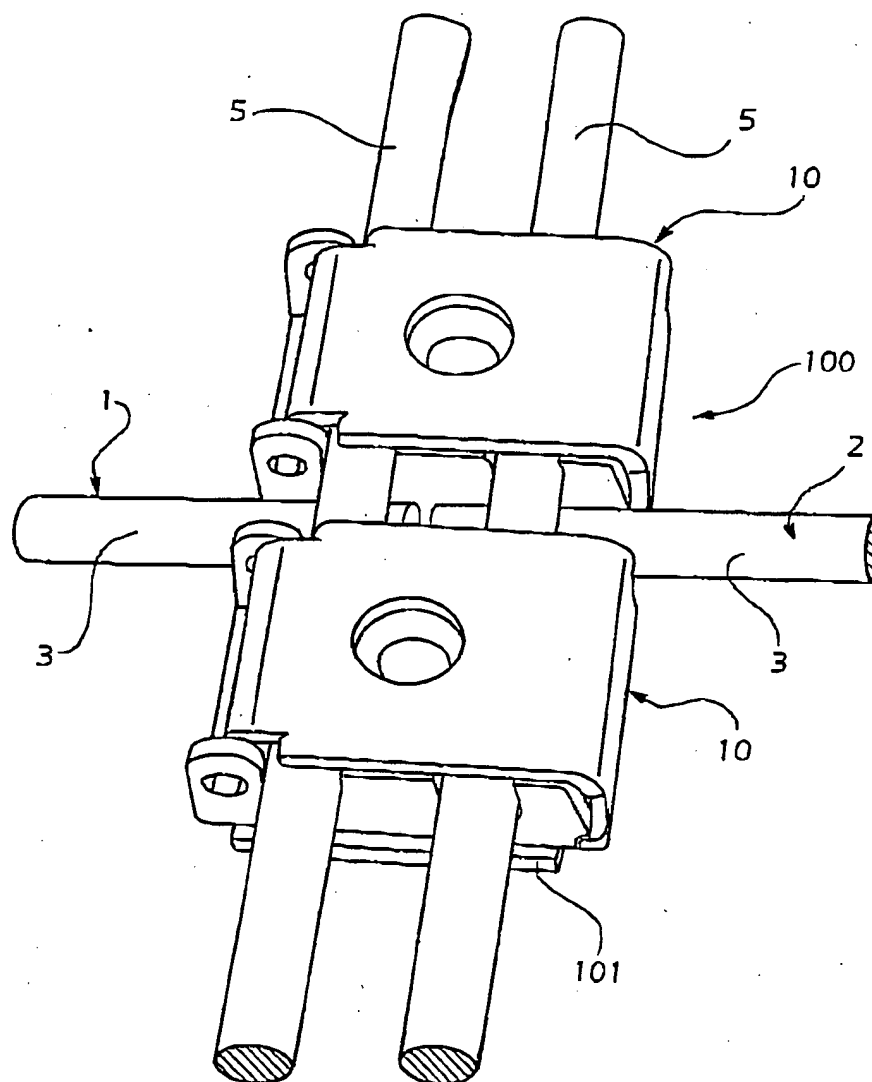
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Fig. 7



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Fig. 9



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Fig. 10

